

Quantifiable Biological Objectives and
Flow Criteria
for Aquatic and Terrestrial
Species of Concern
Dependent on the Delta

DFG November 2010

Selected Tables from Exhibit SWRCB-66

CSPA-307

Table 15 pp. 105-107 (on following slides)

CSPA-307

- 1 = criteria recommended for the whole month
- $\frac{1}{2}$ = criteria recommended for half of the month

Table 15: DFG Flow Criteria

CSF

Category	Function	Flow (cfs)	Year Type	Months													
				O	N	D	J	F	M	A	M	J	J	A	S		
Delta Outflow	Increase quantity and quality of habitat for delta smelt promotes variability of fall flows and habitat conditions in above normal and wet water year types; may result in improved conditions for delta smelt	7100 ($X_2 \leq 81$ km) to 12400 ($X_2 \leq 74$ km)	AN	1	1										1	SW (20)	
		W															
	Promote increased abundance for longfin smelt, starry flounder, zooplankton, American shad, Crangon franciscorum (bay shrimp), and other desirable estuarine species	11400 – 29200 (X_2 between 64 km and 75 km)	All			1	1	1	1	1	1	1				DF	
San Joaquin River	Increase juvenile fall-run Chinook salmon outmigration survival and abundance and provide conditions that will generally produce positive population growth in most years and eventually achieve the doubling goal	At Vernalis: 1500 (Base)	C				1	1	1	1	1	½				DF	
		5500 (Pulse) (4/15-5/15) (Total 7000)							½	½							
		At Vernalis: 2125 (Base)	D				1	1	1	1	1	½					DF
		4875 (Pulse) (4/11-5/20) (Total 7000)								½	½						
		At Vernalis: 2258 (Base)	BN				1	1	1	1	1	½					DF
		6242 (Pulse) (4/6-5/25) (Total 8500)								1	1						
		At Vernalis: 4339 (Base)	AN				1	1	1	1	1	½					DF
		5661 (Pulse) (4/1-5/30) (Total 10000)								1	1						
At Vernalis: 6315 (Base)	W				1	1	1	1	1	½					DF		
8685 (Pulse)							1	1	1	1							

Category	Function	Flow (cfs) (Total 15000)	Year Type	Months												
				O	N	D	J	F	M	A	M	J	J	A	S	
	Minimum adult Chinook salmon attraction flows to decrease straying, increase DO, reduce temperatures, and improve olfactory homing fidelity	At Vernalis: pulse flow: 1000 ¹⁰	All	1												
Eastside Streams	Mokelumne River flows: Juvenile salmon outmigration	1500 ¹¹	All						1	1						
	Eastside stream minimum flows	1060 ¹²	All	1	1	1	1	1	1	1	1	1	1	1	1	1
Sacramento River	Increase juvenile salmon outmigration survival and abundance for fall-run Chinook salmon. Increases juvenile salmon outmigration survival	At Wilkins Slough: pulse flow: 20,000 cfs for 7 days ¹³	All		1	1	1									
	Increase juvenile salmon outmigration survival by reducing diversion into Georgiana Slough and the central Delta	At Freeport: 13,000 - 17,000 ¹⁴	All		1	1	1	1	1	1	1	1				
	Promote juvenile fall-run salmon outmigration	At Rio Vista: 20000 – 30000								1	1	1				
Floodplain	Inundation of off-channel areas improves spawning and recruitment of Sacramento splittail.	≥ 30 day floodplain inundation ¹⁵	AN W				1	1	1	1	1					

¹⁰ Pulse - up to an additional 28 TAF pulse/attraction flow to bring flows up to a monthly average of 2000 cfs except for a critical year following a critical year. Time period based on real-time monitoring and determined by CalFed Op's group

¹¹ Mokelumne River salmon pulse flows. Such flows aid salmon migrations from and into the lower Mokelumne River. Pulse flows of an average of 1000 cfs for 8 months (Mar-Apr) for 8 of 10 years (Henson et al. 2007). While the Mokelumne River is not separated from the rest of the eastside streams in the unit numbers, flows of this level are seen to exist during 63% of the reported years historically.

¹² Eastside stream minimum flows. Such flows would create floodplain habitat, improving local water quality in the Delta and aiding fish migrations in streams. This is estimated here preliminarily as the 25th percentile unimpaired flows for all 12 months for 9 of 10 years (Moyle et al. 2007).

¹³ Pulse flows should coincide with storm events producing unimpaired flows until monitoring indicates that majority of smolts have moved downstream

¹⁴ Positive flows are needed downstream of confluence with Georgiana Slough while juvenile salmon are present

Category	Function	Flow (cfs)	Year Type	Months												
				O	N	D	J	F	M	A	M	J	J	A	S	
	Salmon smolts also benefit from increased food in floodplain habitats.															
Old and Middle Rivers	Reduces straying and improve homing fidelity for San Joaquin basin adult salmon	> -1,500 cfs 14-day running average	C, D							1	1	1	1			
	Reduces entrainment of larval / juvenile delta smelt, longfin smelt, and provide benefits to other desirable species	> 0 or -1,500 cfs, 14-day running average, when FMWT index for longfin smelt is less than 500, or greater than 500, respectively	C, D								1	1				
	If FMWT index for longfin smelt is low, then OMR should be more positive than 0 or -1500 (depending on prior year population) to reduce entrainment losses when abundance is low.															
	Needed to reduce entrainment of adult delta smelt, longfin smelt, and other species; less negative flows may be warranted during periods when significant portions of the adult smelt population migrate into the south or central Delta. Reduced risk of juvenile salmon entrainment and straying to central Delta	> -5,000 cfs 14-day running average	All			1	1	1	1	1	1	1	1			
	Improve survival of San Joaquin River juvenile salmon emigrating down the San Joaquin River and improve subsequent escapement	> -2,500 cfs, 14-day running average, when salmon smolts are in the Delta	All		1	1	1	1	1	1	1	1	1			
	Increase survival of outmigrating smolts, decrease diversion of smolts into central Delta where survival is low	At Jersey Point: Positive flows when salmon are in the Delta	All		1	1	1	1	1	1	1	1	1			